```
=> d his

     (FILE 'HOME' ENTERED AT 15:25:42 ON 23 OCT 2003)

     FILE 'REGISTRY' ENTERED AT 15:26:02 ON 23 OCT 2003
L1                STRUCTURE UPLOADED
L2              1 S L1
L3              8 S L1 FULL
L4                STRUCTURE UPLOADED
L5              0 S L4
L6              0 S L4 FULL

     FILE 'CAPLUS' ENTERED AT 15:28:13 ON 23 OCT 2003
L7              5 S L3
L8             24 S TRYPTYCENE?
L9              0 S L7 AND L8
L10            38 S ?TRYPTYCENE?
L11             0 S L7 AND L5
L12             0 S L7 AND L10
L13        176377 S ?QUINONE?
L14             8 S L10 AND L13
L15        277712 S SILVER?
L16             0 S L14 AND L15
L17         61492 S ?ANTHRACENE?
L18          7806 S L13 AND L17
L19           121 S L18 AND SILVER?
L20             0 S L19 AND L10
L21             1 S L10 AND BROMINAT?
L22             0 S L10 AND ?BROMOSUCCINAMIDE
L23             0 S L10 AND (?CANCER? OR PROLIFERAT? OR PROTEIN SYNTHES? OR NUCLE
L24             1 S L10 AND ANALOG?
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d his

     (FILE 'HOME' ENTERED AT 15:52:48 ON 23 OCT 2003)

     FILE 'CASREACT' ENTERED AT 15:52:59 ON 23 OCT 2003
L1              STRUCTURE UPLOADED

     FILE 'CAPLUS' ENTERED AT 15:53:48 ON 23 OCT 2003
L2         61492 S ?ANTHRACENE?
L3        176377 S ?QUINONE?
L4          7806 S L2 AND L3
L5             5 S L4 AND ?TRYPTYCENE?

     FILE 'BIOSIS' ENTERED AT 15:55:55 ON 23 OCT 2003
L6             0 S ?TRYPTYCENE?
L7            17 S ?TRIPTYCENE?
L8             5 S L7 AND (CANCER OR PROTEIN SYNTHESIS OR NUCLEOSIDE?)
```
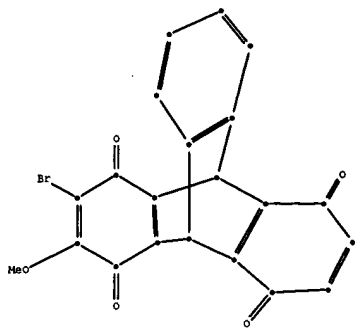
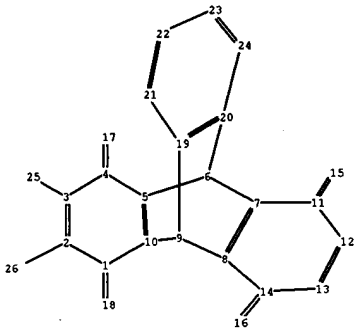

C:\Program Files\Stnexp[redacted]ueries\716.str

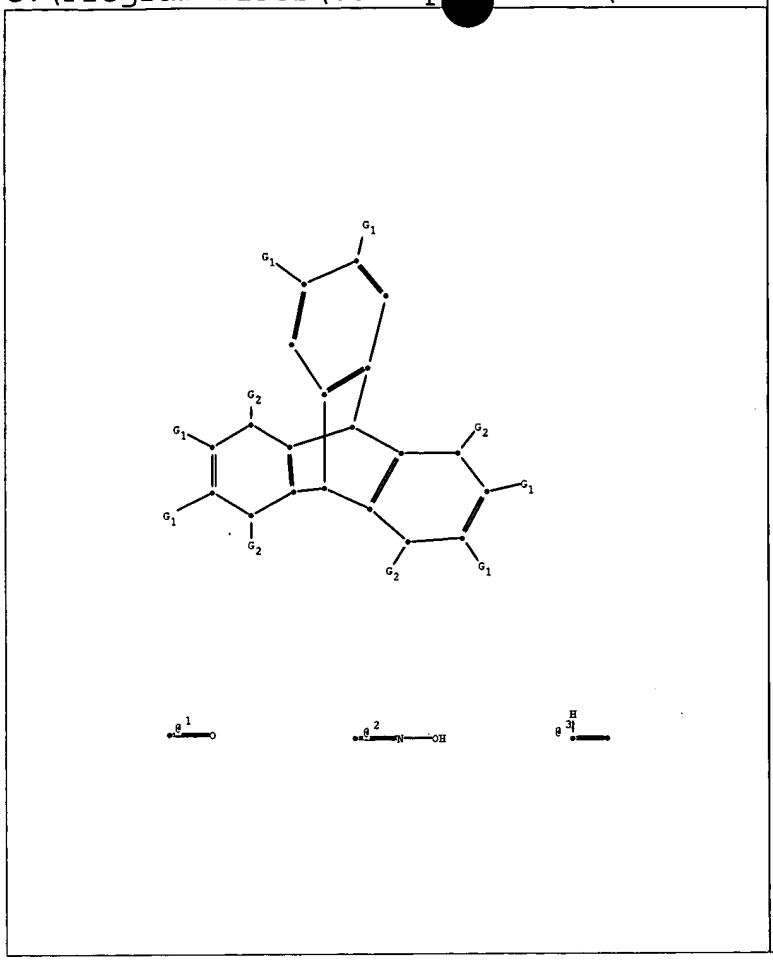


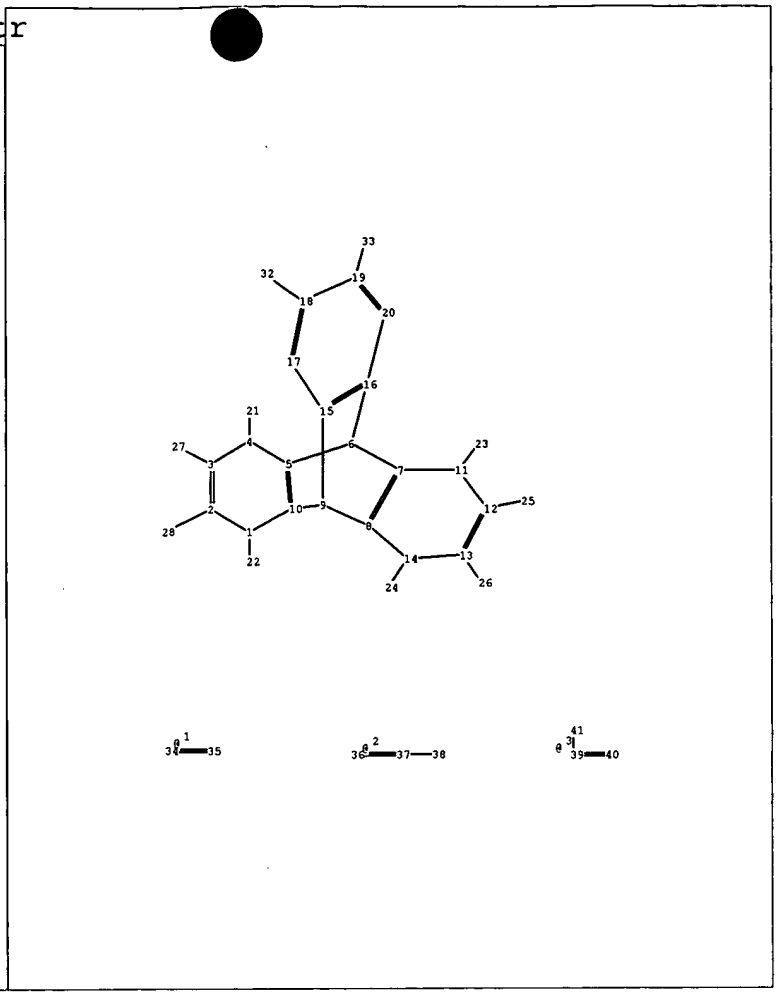


chain nodes :
15 16 17 18 25 26
ring nodes :
1 2 3 4 5 6 7 8 9 10 11 12 13 14 19 20 21 22 23 24
chain bonds :
1-18 2-26 3-25 4-17 11-15 14-16
ring bonds :
1-2 1-10 2-3 3-4 4-5 5-6 5-10 6-7 6-20 7-8 7-11 8-9 8-14
9-10 9-19 11-12 12-13 13-14 19-20 19-21 20-24 21-22 22-23 23-24
exact/norm bonds :
1-18 4-17 11-15 14-16
exact bonds :
1-2 1-10 2-3 2-26 3-4 3-25 4-5 5-6 5-10 6-7 6-20 7-8 7-11
8-9 8-14 9-10 9-19 11-12 12-13 13-14
normalized bonds :
19-20 19-21 20-24 21-22 22-23 23-24
isolated ring systems :
containing 1 :

Match level :
1:Atom 2:Atom 3:Atom 4:Atom 5:Atom 6:Atom 7:Atom 8:Atom 9:Atom
10:Atom 11:Atom 12:Atom 13:Atom 14:Atom 15:CLASS 16:CLASS 17:CLASS
18:CLASS 19:Atom 20:Atom 21:Atom 22:Atom 23:Atom 24:Atom 25:CLASS
26:CLASS

C:\Program Files\Stnexp\Queries\716-2.str





chain nodes :
21 22 23 24 25 26 27 28 32 33 34 35 36 37 38 39 40 41
ring nodes :
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
chain bonds :
1-22 2-28 3-27 4-21 11-23 12-25 13-26 14-24 18-32 19-33 34-35
36-37 37-38 39-40 39-41
ring bonds :
1-2 1-10 2-3 3-4 4-5 5-6 5-10 6-7 6-16 7-8 7-11 8-9 8-14
9-10 9-15 11-12 12-13 13-14 15-16 15-17 16-20 17-18 18-19 19-20
exact/norm bonds :
1-22 2-28 3-27 4-21 11-23 12-25 13-26 14-24 18-32 19-33 34-35
36-37 37-38
exact bonds :
1-2 1-10 2-3 3-4 4-5 5-6 5-10 6-7 6-16 7-8 7-11 8-9 8-14
9-10 9-15 11-12 12-13 13-14 39-40 39-41
normalized bonds :
15-16 15-17 16-20 17-18 18-19 19-20
isolated ring systems :
containing 1 :

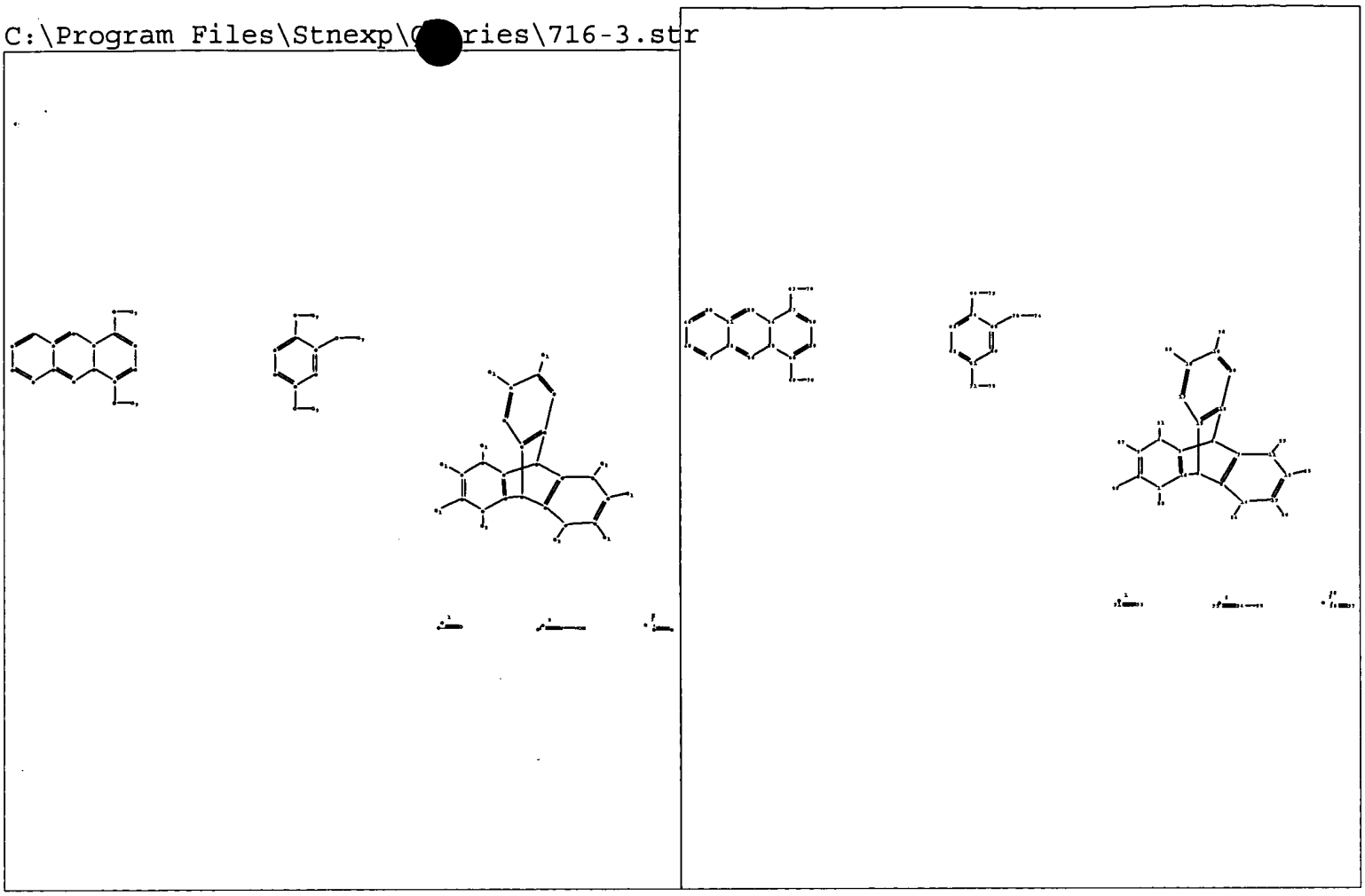
G1:H,X,Ak,SH,MeO,EtO,n-PrO,i-PrO,NH,NH2,S,N

G2:[*1],[*2],[*3]

Match level :
1:Atom 2:Atom 3:Atom 4:Atom 5:Atom 6:Atom 7:Atom 8:Atom 9:Atom
10:Atom

11:Atom 12:Atom 13:Atom 14:Atom 15:Atom 16:Atom 17:Atom
18:Atom 19:Atom 20:Atom 21:CLASS 22:CLASS 23:CLASS 24:CLASS
25:CLASS 26:CLASS 27:CLASS 28:CLASS 32:CLASS 33:CLASS 34:CLASS
35:CLASS 36:CLASS 37:CLASS 38:CLASS 39:CLASS 40:CLASS 41:CLASS

C:\Program Files\Stnexp\Queries\716-3.str



chain nodes :
21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
67 68 69 70 71 73 74 75 76 78
ring nodes :
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 47
48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65
66
chain bonds :
1-22 2-28 3-27 4-21 11-23 12-25 13-26 14-24 18-29 19-30 31-32
33-34 34-35 36-37 36-38 57-67 60-68 61-71 64-69 65-70 67-76
68-78 69-73 70-74 71-75
ring bonds :
1-2 1-10 2-3 3-4 4-5 5-6 5-10 6-7 6-16 7-8 7-11 8-9 8-14
9-10 9-15 11-12 12-13 13-14 15-16 15-17 16-20 17-18 18-19 19-20
47-48 47-52 48-49 49-50 50-51 51-52 51-53 52-56 53-54 54-55
54-57 55-56 55-60 57-58 58-59 59-60 61-62 61-66 62-63 63-64
64-65 65-66
exact/norm bonds :
1-22 2-28 3-27 4-21 11-23 12-25 13-26 14-24 18-29 19-30 31-32
33-34 34-35 57-67 60-68 61-71 64-69 65-70 67-76 68-78 69-73
70-74 71-75
exact bonds :
1-2 1-10 2-3 3-4 4-5 5-6 5-10 6-7 6-16 7-8 7-11 8-9 8-14
9-10 9-15 11-12 12-13 13-14 36-37 36-38 47-48 47-52 48-49 49-50
50-51 51-52 51-53 52-56 53-54 54-55 54-57 55-56 55-60 57-58
58-59 59-60
normalized bonds :
15-16 15-17 16-20 17-18 18-19 19-20 61-62 61-66 62-63 63-64
64-65

65-66
isolated ring systems :
containing 1 : 47 : 61 :

G1:H,S,N,SH,MeO,EtO,n-PrO,i-PrO,n-BuO,NH,NH2,X

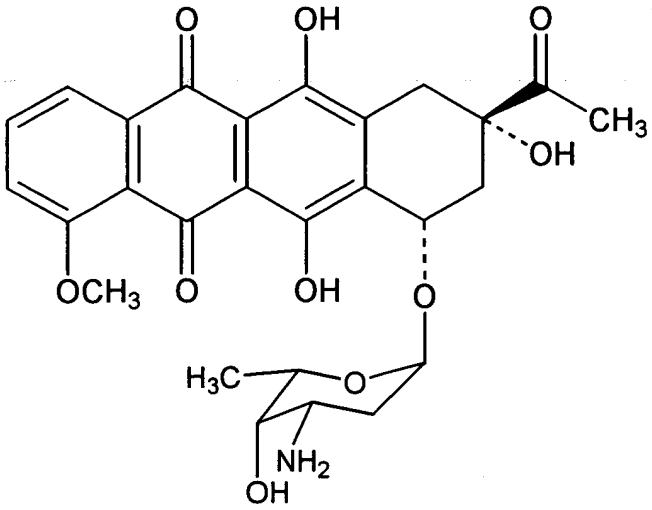
G2:[*1],[*2],[*3]

G3:H,Ak

Match level :
1:Atom 2:Atom 3:Atom 4:Atom 5:Atom 6:Atom 7:Atom 8:Atom 9:Atom
10:Atom 11:Atom 12:Atom 13:Atom 14:Atom 15:Atom 16:Atom 17:Atom
18:Atom 19:Atom 20:Atom 21:CLASS 22:CLASS 23:CLASS 24:CLASS
25:CLASS 26:CLASS 27:CLASS 28:CLASS 29:CLASS 30:CLASS 31:CLASS
32:CLASS 33:CLASS 34:CLASS 35:CLASS 36:CLASS 37:CLASS 38:CLASS
47:Atom 48:Atom 49:Atom 50:Atom 51:Atom 52:Atom 53:Atom 54:Atom
55:Atom 56:Atom 57:Atom 58:Atom 59:Atom 60:Atom 61:Atom 62:Atom
63:Atom 64:Atom 65:Atom 66:Atom 67:CLASS 68:CLASS 69:CLASS
70:CLASS 71:CLASS 73:CLASS 74:CLASS 75:CLASS 76:CLASS 78:CLASS
fragments assigned product role:
containing 1
fragments assigned reactant/reagent role:
containing 47
containing 61

Monograph number: 2890.
Title: Daunorubicin.
CAS Registry number: [20830-81-3]
CAS name(s): (8*S-cis*)-8-Acetyl-10-[(3-amino-2,3,6-trideoxy-α-L-*lyxo*-hexopyranosyl)oxy]-7,8,9,10-tetrahydro-6,8,11-trihydroxy-1-methoxy-5,12-naphthacenedione;
Additional name(s): daunomycin; leukaemomycin C; rubidomycin; daunomycinone
Drug code(s): RP-13057;
Trade name(s): Cerubidin (M & B) .
Molecular formula: $C_{27}H_{29}NO_{10}$;
Molecular weight: 527.53.
Percent Composition: C 61.47%, H 5.54%, N 2.66%, O 30.33%.
Literature references: Anthracycline antibiotic related to the rhodomycins, *q.v.* Isolated from fermentation broths of *Streptomyces peucetius:* G. Cassinelli, P. Orezzi, *Giorn. Microbiol.* **11,** 167 (1963), *C.A.* **62,** 9482b (1965); A. Di Marco *et al., Nature* **201,** 706 (1964); *eidem,* **Belg.** pat. **639,897**; *eidem,* **U.S.** pat. **4,012,284** (1964, 1977 both to Soc. Farmaceut. Italia); S. Pinnert *et al.,* **U.S.** pat. **3,997,662** (1976 to Rhone-Poulenc). Daunorubicin is a glycoside formed by a tetracyclic aglycone, daunomycinone , ($C_{21}H_{18}O_8$) and an amino sugar, ***daunosamine,*** ($C_6H_{13}NO_3$), 3-amino-2,3,6-trideoxy-L-*lyxo*-hexose: F. Arcamone *et al., J. Am. Chem. Soc.* **86,** 5334, 5335 (1964); R. H. Iwamoto *et al., Tetrahedron Letters* **1968,** 3891. Absolute stereochemistry: F. Arcamone *et al., Gazz. Chim. Ital.* **100,** 949-989 (1970). Identity with rubidomycin: G. L. Tong *et al., J. Pharm. Sci.* **56,** 1691 (1967). Synthesis of daunosamine: J. P. Marsh *et al., Chem. Commun.* **1967,** 973; T. Yamaguchi, M. Kojimo, *Carbohyd. Res.* **59,** 343 (1977); P. M. Wovkulich, M. R. Uskokovic, *J. Am. Chem. Soc.* **103,** 3956 (1981); of daunomycinone: C. M. Wong *et al., Can. J. Chem.* **51,** 466 (1973); J. S. Swenton, P. W. Reynolds, *J. Am. Chem. Soc.* **100,** 6188 (1978); K. Krohn, K. Tolkiehn, *Ber.* **112,** 3453 (1979); F. M. Hauser, S. Prasanna, *J. Am. Chem. Soc.* **103,** 6378 (1981). Total synthesis of daunorubicin: E. M. Acton *et al., J. Med. Chem.* **17,** 659 (1974). Purification: E. Oppici *et al.,* **Belg.** pat. **898,506**; *eidem,* **Brit.** pat. **Appl. 2,133,005** (both 1984 to Farmitalia). Toxicity data: A. Di Marco *et al., Cancer Chemother. Rep.* (part 1) **53,** 33 (1969). Review of properties, biosynthesis, fermentation: R. J. White, R. M. Stroshane, *Drugs Pharm. Sci.* **22,** 569-594 (1984); of carcinogenic action in laboratory animals: *IARC Monographs* **10,** 145-152 (1976); of toxicology: R. J. Maral *et al., Cancer Treat. Rep.* **65,** Suppl. 4, 9-18 (1981); of use in treatment of solid tumors: R. B. Weiss *et al., ibid.* 25-28; of interactions with nucleic acids: S. Neidle, M. R. Sanderson, in *Molecular Aspects of Anti-cancer*

Drug Action, S. Neidle, M. J. Waring, Eds. (Verlag-Chemie, Florida, 1983) pp 35-nism of cytotoxicity: H. S. Schwartz, *ibid.* pp 93-125; of metabolism and clinical pharmacokinetics: C. E. Riggs, Jr., *Sem. Oncol.* **11,** Suppl. 3, 2-11 (1984). *Review:* A. DiMarco *et al., Antibiotics* **vol. 3,** J. W. Corcoran, F. E. Hahn, Eds. (Springer Verlag, New York, 1975) pp 101-128.



Daunomycinone

Daunosamine

Properties: mp 208-209° . LD_{50} in mice, rats (mg/kg): 20 , 13 i.v. ; 5 , 8 i.p. (DiMarco, 1977) .

Melting Point: mp 208-209°

Derivative: Hydrochloride,
Molecular Formula: $C_{27}H_{29}NO_{10}.HCl$,
CAS Registry: [23541-50-6]
Trade name(s): ***Cérubidine (Rhône-Poulenc) , Daunoblastina (Farmitalia) , Ondena (Bayer)***

Properties: Thin red needles, dec 188-190°. $[\alpha]_D^{20}$ +248 ± 5° (c = 0.05-0.1 in methanol) . Sol in water, methanol, aq alcohols. Practically insol in chloroform, ether, benzene. Color of aq soln changes from pink at acid pH to blue at alkaline pH. Absorption max (methanol): 234, 252, 290, 480, 495, and 532 nm ($E_{1cm}^{1\%}$ 665, 462, 153, 214, 218, and 112). LD_{50} in mice (mg/kg): 26 i.v. (DiMarco, 1969) .

Rotation: +248 ± 5°

THERAP CAT: Antineoplastic.